

# SIMPLIFYING 2, 4-D

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## INTRODUCTION

This circular is written to help those who are inexperienced in the use of 2,4-D and to provide information which will answer the many inquiries received about this popular herbicide. The man who is about to use 2,4-D for the first time can be assured that there is nothing complicated about applying this chemical. The objective is to put on the recommended amount of 2,4-D per acre uniformly. Every farmer is accustomed to applying fertilizer, to making a uniform distribution of the recommended amount. But because only a few ounces of 2,4-D are usually needed to treat an acre, something must be added to give it bulk. Otherwise the recommended quantity could not be evenly distributed over the whole acre.

When in the form of dust, the bulky material has already been added by the manufacturer. Therefore, this product can be dumped into a dusting machine and applied without further dilution. But when the directions on the container state that the 2,4-D is to be applied as a spray, then the amount of product recommended per acre must be diluted, or made bulky, by the addition of water.

When one regards water as just a filler—a means of distributing a definite amount of 2,4-D per acre—the complexity associated with applying this chemical disappears. The amount of water used has nothing to do with the effectiveness of 2,4-D. It is the amount of 2,4-D per acre that is all important and that amount may be applied in any convenient amount of water.

### *Characteristics of 2,4-D*

One of the most amazing characteristics of this popular weed killer is that it attacks some plants and not others. Like hay fever, it attacks some individuals and allows others to escape. Furthermore, some plants which are quite susceptible to 2,4-D when they are young and succulent, become quite resistant as they near maturity. It may sometimes happen that an inexperienced user of 2,4-D fails to kill susceptible weeds with this chemical, because he applied it too late in the season.

Generally speaking, plants of the grass family which include wheat, oats, barley, and rye, are resistant to 2,4-D. A great many, but not all, broad leaved plants are, however, very susceptible to this herbicide. This difference in the susceptibility of plants to 2,4-D explains why weeds, such as mustard and stinkweed, can be killed in grain without injuring the crop. But grain crops are not completely immune to injury from this chemical. If too much of it is applied, the yield may be reduced or the date of maturity delayed. In addition, abnormalities may appear, especially in the heads.

There are also degrees of susceptibility to 2,4-D within broad leaved plants. Red clover, for example, is susceptible to 2,4-D but not as susceptible as mustard. Advantage can, therefore, be taken of this degree of susceptibility, for the clover escapes injury when just enough chemical to kill the mustard is used.

No one has given a simple explanation of how 2,4-D kills a plant or why it kills some plants and not others. It is, however, known that its herbicidal action is most pronounced when applied on fast growing plants. Other remarkable characteristics of this chemical which means death to so many plants, are that it is not poisonous to animals, it is not corrosive to metals, and it is not inflammable.

### ***Many Brands Available***

The accompanying table lists a total of 113 brands of 2,4-D which were submitted for registration in Canada up to March 15, 1949. Originally 2,4-D was the abbreviation for 2,4-dichlorophenoxyacetic acid, but now it also designates a number of compounds that are derived from this acid. They are seldom sold in their pure form for weed killing purposes. Instead, they are combined with certain other chemicals to make them soluble in water, or with a carrier, such as oil. The chemical 2,4-D may be purchased as a powder to be applied dry, as a powder to be dissolved in water, or as a liquid to be diluted with water.

### ***The Three Groups or Formulations of 2,4-D***

There are at present three main groups or formulations of 2,4-D compounds used as weed killers: the sodium salts, the amine salts, and the esters. Section A of the table lists the brands which are to be diluted with water and section B lists both the powders which are to be applied as purchased and the powders which are to be dissolved in water.

All the brands within the sodium salt group act in much the same way. All the brands within the amine group are similar in action, and all the esters are also similar to each other in action. The sodium salts are slow killers, the esters act much faster, and the amines are intermediate in speed of action. There seems to be a relationship between speed of action and potency. As the sodium salt is weakest, more of it has to be used. The difference in potency between the amines and esters is not so pronounced, but, in the opinion of most users, the ester is more potent than the amine and a slightly lower amount is usually applied per acre. On account of the rapid action of the esters, their effectiveness is not impaired when rain falls immediately after they have been applied. The slower acting sodium salt and the amines may be washed off before herbicidal action starts, if rain falls soon after their application. When conditions are favourable more fumes, or vapours, are given off by esters than by the other kinds of 2,4-D. As these fumes may damage desirable plants in the vicinity it is preferable to use another kind of 2,4-D when spraying is to be done close to susceptible crops, gardens, and flower beds, etc.

### ***Post-emergence and Pre-emergence Treatments***

The arrival of 2,4-D in the realm of weed control has brought with it some new terms with which one must become familiar.

In experiments with 2,4-D, it was observed that, when bare soil was sprayed, the treatment checked the emergence of annual weed seedlings. That observation revealed a new way to attack weeds and it had to be given a new name to differentiate it from the normal way of attacking weeds with chemicals. Previously, selective chemicals had always been applied after the weeds and the crop were through the ground. Post-emergence is the name now given to that kind of treatment, and pre-emergence is obviously the right name for a treatment applied before the crop or the weeds emerge.

Pre-emergence treatment because of its newness deserves special mention. Theoretically it works this way. When 2,4-D is applied to bare soil, it forms a film on the surface of the soil. It depends on the nature of a plant whether or not it can push through this film uninjured. If the seedling is tiny and delicate, as are most annual weed seedlings, it will probably be killed by this deadly film, but if the seedling is big and robust, like an emerging bean, it will likely go right



through this film unscathed. Beans, however, are susceptible to injury if treated after they emerge. Pre-emergence treatment with chemicals, therefore, offers a hope of being able to control weeds in certain crops which cannot be chemically treated after they emerge.

It should be pointed out, however, that pre-emergence weed control treatments are not so dependable as are the post-emergence treatments. If rain comes before the weed seedlings have emerged, the chemical film is destroyed and the treatment is wasted. Furthermore, a heavier application of chemical to control the same weeds is required for pre-emergence than for post-emergence treatments. Interest is focused on pre-emergence treatments for weed control mainly because such treatments offer hope of controlling weeds in crops which after emergence are very sensitive to herbicides.

### ***How Much to Apply on Various Crops***

It would be rather confusing if an attempt were made to state how much amine, ester or sodium salt should be applied to control specific weeds in various crops, under the widely different conditions that prevail in Canada. Therefore, when a rate is recommended in any of the following sections of this circular, it will be for the amine formulation—the formulation which has an action intermediate between the esters and the sodium salts. In order to give the reader an indication of the relative potency of these three formulations the following example is stated. For killing susceptible annual weeds in wheat, oats, barley, and rye, 3 ounces of 2,4-D acid in the ester form will give approximately the same results as 4 ounces of an amine or 6 ounces of a sodium salt.

#### ***Wheat, Oats, Barley, and Rye, not Seeded with Legumes***

Most of the weeds which commonly appear in these grain crops can be effectively controlled by 2,4-D without serious crop injury. *Annual weeds*, as



FIG. 1—Growth in this field of grain is about six inches high. This is the right stage at which to treat with 2,4-D for the control of many annual weeds.

a rule, are controlled by less chemical than are perennials. When annuals only are present, 4 ounces of pure acid is recommended. It should be applied when the weeds are in the seedling stage and when the grain is about 6 inches high. If for any reason treatment has to be delayed, then the weeds gradually become more difficult to kill and more 2,4-D must be used. If the weeds have begun to flower, then double the amount recommended for the seedling stage should be used. However, treatments at the flowering stage are not recommended.

Many *perennial weeds*, including thistles, can be suppressed in a grain crop to such an extent that they offer little competition to the crop. If the main weeds in a grain field are perennials, they should be sprayed when about 2 to 4 inches high. Although good results have been secured with as little as 4 ounces of pure 2,4-D per acre, a little higher rate is more reliable. It is advisable, therefore, to use 5 or 6 ounces of pure acid per acre on weeds at the early growth stage. If the treatment *must* be delayed until the weeds are in the bud or the early flower stage, as much as 10 ounces per acre may be used. However, when 8 or more ounces per acre are used, some crop injury may occur, but such injury is usually offset by the reduction in weeds.

#### *Wheat, Oats, Barley, and Rye, Seeded to Legumes*

Do not apply 2,4-D to grain seeded down with alfalfa or sweet clover. These two legumes are very sensitive to 2,4-D and it is, therefore, not wise to use any form of 2,4-D on them. However, red clover, alsike, and ladino clovers, appear to be moderately resistant to 2,4-D and will tolerate up to 4 ounces of the pure acid per acre. This amount will kill wild mustard, stinkweed, lamb's quarters, and many other species of annual weeds that occur in grain crops if applied when the plants are in the seedling stage.

When crops seeded down with red clover, alsike or ladino are sprayed or dusted with 2,4-D, special care must be taken to apply a uniform treatment. Overlapping or travelling at varying speeds may put on sufficient extra chemical to seriously injure these clovers. Grain crops seeded with legumes should also be treated when the crop is about 6 inches high.

#### *Flax for Linseed*

Flax is much more sensitive to 2,4-D than are the cereals. For this reason care must be taken to ensure that only the specified amount is applied. As flax competes so poorly with weeds their early removal is important, but the flax should have developed 4 or 5 leaves before the 2,4-D is applied. Nor should flax be treated when it is in the bud stage. Three or four ounces of 2,4-D per acre applied when the weeds are in the seedling stage is a safe amount to use. Crop injury may result if 5 ounces or more are applied to flax at any stage of growth.

#### *Corn*

Although certain varieties of hybrid corn are more sensitive to 2,4-D than others, it is possible to control most broad-leaved annual and perennial weeds without serious injury to the crop. Since this crop is less sensitive to 2,4-D injury when it is young than at later growth stages, the recommended height for spraying is at about 6 inches. From 4 to 6 ounces of 2,4-D in the pure form, if applied with complete ground coverage, should give satisfactory results. If the treatment is applied to the rows only, a smaller amount of 2,4-D should be used.



### *Pasture*

Time of application is of the utmost importance when 2,4-D is used for weed control in pastures. The weeds to be killed should be in the seedling, rosette, or succulent growth stage. Often there is a great assortment of weeds in a pasture and they do not all emerge at the same time. Dandelions, for instance, are in the active growth stage very early in the spring, but Canada thistle does not emerge until several weeks later. It is obvious, therefore, that when there is a varied assortment of weeds which emerge at different times, one application will not control them all. If only one treatment is to be made, it should be applied when the most prevalent weed is in the rapid growth stage.

Many species of weeds, such as dandelions, Canada thistle, and plantain, may be controlled by one pound of pure 2,4-D acid per acre. Buttercup is more resistant and will require  $1\frac{1}{2}$  pounds per acre. Creeping rooted weeds, such as Canada thistle, usually send up new shoots a few weeks after the first application. This regrowth should receive a second application of the same strength as the first.

The amounts of 2,4-D recommended to control weeds in pasture may temporarily retard the growth of Dutch white clover, which is so desirable in a pasture. It generally recovers and, due to the removal of the weeds, makes a better growth than before the treatment.

The control of weeds in pasture by 2,4-D should be regarded as a supplement to good management and the judicious use of fertilizer. Many pasture weeds would disappear if the land were properly fertilized. Unfortunately, Canada thistle and certain other pasture weeds cannot be controlled by the application of fertilizers and 2,4-D is, therefore, recommended for their control.

### *The Application of 2,4-D*

The following procedure is necessary to determine the amount of liquid which your sprayer applies per acre at the speed you choose to operate.

- (a) Divide the number of square feet in an acre (43,560) by the width (in feet) of your sprayer boom. The figure obtained will be the distance in feet you will have to travel to spray one acre.
- (b) Be certain that all parts (pump, nozzles, gauge etc.) of your sprayer are working correctly.
- (c) Fill tank with water up to a mark.
- (d) Start tractor, turn on sprayer and cover one acre as determined in (a) at the speed you intended to use for your spraying operations.
- (e) Shut off sprayer, then measure the number of gallons you have to add to fill tank to original mark. This will be the number of gallons your sprayer puts on an acre.

In the Prairie Provinces, where the land is divided into quarter sections, farmers with sprayer booms  $16\frac{1}{2}$  or 33 feet wide, merely need to travel the length of one quarter section to find the amount of liquid which the sprayer delivers per acre. If the sprayer boom is  $16\frac{1}{2}$  feet then you will have covered one acre. If the sprayer boom is 33 feet then your result should be divided by 2.

Your sprayer will likely apply between 5 and 10 gallons per acre, depending on your operating speed. If, for example, it applies 5 gallons per acre, then for

every 5 gallons you should add the number of ounces of 2,4-D or pints of product recommended per acre. The 5 gallons of water represents the amount of filler you should use in order to distribute the recommended amount of 2,4-D uniformly.

#### *How to Use the Table*

The table is presented to help you make the best use of any product you have on hand or are intending to purchase. All the necessary calculations have been made for your guidance.

If the product is a liquid, then find the name of the product in Section A of the table. Let us suppose it to be A. A. M.D. Liquid Ester, the first name in Section A. If you wish to apply 3 ounces of pure 2,4-D per acre, the table tells you to use  $8\frac{1}{4}$  liquid ounces of the product. Should you wish to apply 1 pound of pure 2,4-D per acre, you are instructed to use 2 pints and  $4\frac{1}{2}$  liquid ounces of the product for each acre you intended to treat. These amounts of product are to be diluted with water.

If the product chosen is powder or a dust, look for it in Section B of the table. The amount you are instructed to use must be weighed. All the powders are to be dissolved in water but the dusts are to be applied dry in the same form as purchased.



SECTION A—LIQUIDS

AMOUNTS IN LIQUID MEASURE OF DIFFERENT BRANDS NEEDED TO SUPPLY VARIOUS RATES OF PURE 2,4-D PER ACRE									
Brand Name	Registrant	Formulation	Guaranteed ounces 2,4-D acid per imperial gallon of product	In order to apply pure 2,4-D at 3 oz., 4 oz., 5 oz., or 1 lb. per acre, use the amount given in the respective column below.				pt.	oz.
				3 oz.	4 oz.	5 oz.	1 lb.		
				pt.	pt.	pt.	pt.	pt.	oz.
Liquids—to be diluted with water									
ESTERS—									
A.A.M.D., Liquid Ester	Alberta Association of Municipal Dist.	Ethyl Ester	57.6	8 $\frac{1}{2}$	11	14	2	4 $\frac{1}{2}$	
Agricultural Weed-no-More Alta Ester	The Sherwin Williams Company Alberta Fire and Tractor Equip Ltd.	Alkyl Ester Isopropyl Ester	50.8 56.0	9 $\frac{1}{2}$ 8 $\frac{1}{2}$	12 $\frac{1}{2}$ 11 $\frac{1}{2}$	15 $\frac{3}{4}$ 14 $\frac{1}{4}$	2 2	10 $\frac{1}{2}$ 5 $\frac{3}{4}$	
Chemco Ester	Chemical Products Limited	Isopropyl Ester	51.0	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{1}{2}$	2	10 $\frac{1}{2}$	
Chipman 2,4-D Ester Liquid	Chipman Chemicals Limited	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
De-Weed Liquid 2,4-D	Commercial Chemicals Ltd.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Diamond A, 2,4-D Ester	The J. H. Ashdown Hardware	Isopropyl Ester	51.0	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{1}{2}$	2	10 $\frac{1}{2}$	
Esteron 44	The Dow Chemical Co.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Feed-Rite Ester	Feed Rite Mills Ltd.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Geigy 2,4-D Weed Killer	Geigy Company Inc.	Butyl Ester	50.5	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{3}{4}$	2	10 $\frac{3}{4}$	
Herbate Ester	Canadian Industries Limited	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
I.J.H. 2,4-D Ester	I. J. Haug & Sons Ltd.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Ivy Kill	Plant Products Co. Ltd.	Isopropyl Ester	60.2	8	10 $\frac{1}{2}$	13 $\frac{1}{4}$	2	2 $\frac{1}{2}$	
National Stantox Ester p 44	National Grain Company Ltd	Isopropyl Ester	64.17	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
National Stantox Ester p 44	National Grain Company Ltd.	Propyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
No-Weed 52	Chemi-Serve Limited	Isopropyl Ester	52.0	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{1}{2}$	2	9 $\frac{1}{4}$	
T & T 2,4-D Ester Liquid	T & T Seed & Chemi. Ltd.	Isopropyl Ester	54.5	8 $\frac{3}{4}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	7	
Victoria Ester	Victoria Products Co.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Weedanol Ester	J. B. & D. Company	Isopropyl Ester	76.8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$	
Weedaway E. L. 38	Hastings & Sons Ltd.	Isopropyl Ester	56.0	8 $\frac{1}{2}$	11 $\frac{1}{2}$	14 $\frac{1}{2}$	2	5 $\frac{3}{4}$	
Weed-Cop E 32	Fairview Chemicals Ltd.	Isopropyl Ester	51.0	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{1}{2}$	2	10 $\frac{1}{4}$	
Weedaway E. L. 53	Hastings & Sons Ltd.	? Ester	68.0	7	9 $\frac{1}{2}$	11 $\frac{1}{2}$	2	17 $\frac{1}{2}$	
Weed Foe Concentrate 2,4-D	Ansell Laboratories Ltd.	Isopropyl Ester	64.0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—	
Weed-No-More Regular	The Sherwin Williams Co.	Isopropyl Ester	20.6	3 $\frac{1}{2}$	11	19	6	4 $\frac{1}{4}$	
Weedone Concentrate 48	American Chemical Paint Co.	Butyl Ester	57.6	8 $\frac{1}{4}$	11	14	2	4 $\frac{1}{4}$	
Western Brand #307	Western Chemicals Ltd.	Butyl Ester	50.4	9 $\frac{1}{2}$	12 $\frac{1}{2}$	15 $\frac{3}{4}$	2	10 $\frac{3}{4}$	
Worthmore Ester Concentrate	North American Lubrication Company	Isopropyl Ester	57.6	8 $\frac{1}{4}$	11	14	2	4 $\frac{1}{2}$	

## SECTION A—LIQUIDS

AMOUNTS IN LIQUID MEASURE OF DIFFERENT BRANDS NEEDED TO SUPPLY VARIOUS RATES OF PURE 2,4-D PER ACRE									
Brand Name	Registrant	Formulation	Guaranteed ounces 2,4-D imperial gal- lon of product	In order to apply pure 2,4-D at 3 oz., 4 oz., 5 oz., or 1 lb. per acre, use the amount given in the respective column below.					
				3 oz.	4 oz.	5 oz.	1 lb.		
AMINES—									
A. A. M. D. Liquid Amine	Alberta Association of Muni- cipal Districts	Isopropylamine	76.8	6½	8½	10½	1	13½	
Atomik 2,4-D Weed Killer	Lloyd Linton Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
B & F 2,4-D Herbicide	Baribeau & Fils Co.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Beacon Weed Killer	Beacon Chemicals of Canada Limited	? Amine	34.5	14	18½	3½	3	14½	
Calweed	Anderson & Later Ltd.	Triethanolamine	64.0	7½	10	12½	2	—	
Capo Weed-Bane	The Capo Polishes Ltd.	Triethanolamine	56.6	6½	8½	10½	2	5½	
Chipman 2,4-D Amine Liquid	Chipman Chemicals Ltd.	Triethanolamine	78.0	8½	11½	14½	2	5½	
C. P. L. Weed Killer	Chemical Products Co. Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Diamond A 2,4-D Amine	The J. H. Ashdown Co.	Triethanolamine	78.0	6½	8½	10½	1	12½	
Eaton's 2,4-D Weed Killer	The T. Eaton Co. Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Elkay's Weed Killer	Rexall Drug Co. Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Elmira Brand Weed Bane	Read Brothers Fertilizers, Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Famillex 2,4-D Weed Killer	The Famillex Products Co.	? Amine	34.5	14	18½	3½	3	14½	
Feed-Rite Amine	Feed-Rite Mills	Alkanolamine	76.8	6½	8½	10½	1	13½	
Glid-N-20% 2,4-D Weed Killer	The Glidden Co. Ltd.	Triethanolamine	36.5	13½	17½	2	3	10½	
Havok Weed Killer	Laurentian Laboratories Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
Herbatz Amine	Canadian Industries Ltd.	Alkanolamine	80.0	6	8	10	1	12	
Hormono 2,4-D Liquid	Plant Products Co. Ltd.	Triethanolamine	56.6	8½	11½	14½	2	5½	
I. J. H. Amine	I. J. Haug & Sons Ltd.	Isopropanolamine	56.6	8½	11½	14½	2	5½	
Kemico 2,4-D Weed Killer	Chemical Specialties Ass'n	Triethanolamine	56.6	8½	11½	14½	2	5½	
Killweed Liquid Amine	Shanahan's Ltd.	Isopropanolamine	36.5	13½	17½	2	3	10½	
National Stantox Amine 80	National Grain Co. Ltd.	Alkanolamine	80.0	6	8	10	1	12	
National Stantox Amine 80	National Grain Co. Ltd.	Triethanolamine	79.26	6	8	10	1	12	
National Stantox 2,4-D Weed Killer	National Grain Co. Ltd.	Triethanolamine	36.5	13½	17½	2	3	10½	
Niagara Selective Weed Killer 20%	Niagara Brand Spray Co. Ltd.	Triethanolamine	36.5	13½	17½	2	3	10½	
Niagara Selective Weed Killer 40%	Niagara Brand Spray Co. Ltd.	Triethanolamine	79.8	6	8	10	1	12	
Pied Piper 2,4-D Weed Killer	Pied Piper Co. Ltd.	Triethanolamine	35.2	13½	18½	2½	3	13½	
Pixie 2,4-D Weed Killer	Camsol Products Ltd.	Isopropanolamine	38.0	12½	16½	1	3	7½	



Pratt's Weed Bane	Pratt Food Co. of Canada	Triethanolamine	56-4	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Purina Weed Killer, Amine type	Ralston Purina Co.	Isopropanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Rawleigh's Weed Killer	The W. T. Rawleigh Co. Ltd.	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Sapho Weedbane	Kennedy Manufacturing Co.	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Shell Weedkill	Shell Oil Co. of Canada.	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Standag "I"	John Brodie & Co.	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Thompson's Weedicide Dee-Cee-Pee 40	Thompson Horticultural Chem.	Diethanolamine	40-0	12	16	—	3	4
Thompson's Weedicide Dee-Cee-Pee 20	Thompson Horticultural Chem.	Diethanolamine	20-0	4	12	—	6	8
T & T Amine Liquid	T & T Seeds & Chemicals Ltd.	Triethanolamine	56-5	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Victoria Amine	Victoria Products Co. Ltd.	Alkanolamine	76-8	9 $\frac{1}{4}$	12 $\frac{1}{4}$	15 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Weedanol, 2,4-D in Carbowax	J. B. & D. Company	Triethanolamine	51-8	9 $\frac{1}{4}$	12 $\frac{1}{4}$	15 $\frac{1}{2}$	2	9 $\frac{1}{4}$
Weedanol Amine	J. B. & D. Company	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Weedar 64	American Chemical Paint Co.	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Weedaway A. L. 40	Hastings and Sons Ltd.	Alkanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Weed-Bane	Naugatuck Chemicals	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Weed-Bane	British-Amer.-Chem. Co. Ltd.	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Weed Cop A 30	O-Cedar of Canada Ltd.	Triethanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Weed Cop A 40	Fairview Chemicals Co. Ltd.	Isopropanolamine	56-6	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Weedex Brand Weed Killer	Fairview Chemicals Co. Ltd.	Isopropanolamine	77-0	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
Weed-Master	Chemicals Limited	Triethanolamine	56-4	8 $\frac{1}{2}$	11 $\frac{1}{4}$	14 $\frac{1}{4}$	2	5 $\frac{1}{4}$
Western Brand No. 308	Hickman Implements Ltd	Triethanolamine	64-0	7 $\frac{1}{2}$	10	12 $\frac{1}{2}$	2	—
Worthmore Amine Concentrate	Western Chemicals Ltd.	Treithanolamine	76-9	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
"103" 2,4-D Weed Killer	North American Lubrication Co.	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
	Canadian Distributors Ltd.	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
2,4Dow Weed Killer Formula 40	Dow Chemical Co.	Alkanolamine	80-0	6	8	10	1	12
2,4D Rex Amine	Canada Rex Spray Co.	Isopropanolamine	76-8	6 $\frac{1}{4}$	8 $\frac{1}{4}$	10 $\frac{1}{2}$	1	13 $\frac{1}{4}$
2,4-D Weed Killer	Monsanto (Canada) Ltd.	Triethanolamine	55-2	13 $\frac{3}{4}$	18 $\frac{1}{4}$	23 $\frac{1}{4}$	3	13 $\frac{1}{4}$

2,4-D PRODUCTS REVIEWED BY THE DIVISION OF BOTANY AND PLANT PATHOLOGY UP TO MARCH 15, 1949—Concluded

SECTION B—POWDERS AND DUSTS

WEIGHTS OF DIFFERENT BRANDS NEEDED TO SUPPLY VARIOUS RATES OF PURE 2,4-D PER ACRE

Brand Name	Registrant	Formulation	Guaranteed 2,4-D content	In order to apply pure 2,4-D at 3 oz., 4 oz., 5 oz., or 1 lb. per acre, use the amount given in the respective column below.				
				3 oz.	4 oz.	5 oz.	1 lb.	
Powders—to be dissolved in water	Canadian Industries Ltd. Chipman Chemicals Ltd. Commercial Chemicals Ltd. J. K. Crang Co Limited National Chemical Exterminating Company Canadian Industries Ltd. Plant Products Co. Ltd. Plant Products Co. Ltd. Ralston Purina Co. The W. A. Jenkins Co. Ltd. T & T Seeds & Chemi. Ltd. Ansell Laboratories Ltd. The Dow Chemical Co.	Ammonium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt	77.0 80.5 60.0 82.0 14.5  70.0 24.0 70.0 50.0 70.0 80.0 70.0 80.5	lb. oz.	lb. oz.	lb. oz.	lb. oz.	1 lb.
				4	5½	6½	1	4¾
				3¾	5	6¼	1	4
				5	6¾	8¼	1	10¾
				3¾	5	6	1	3½
				4¾	11½	2	6	14¼
				4½	5¾	7¼	1	6¾
				12½	¾	4¾	4	2¾
				4¾	5¾	6¾	1	6¾
				6	8	10	2	0
				4½	5¾	7¼	1	6¾
				3¾	5	6¼	1	4
				4½	5¾	7¼	1	6¾
				3¾	5	6¼	1	4
Dusts—to be applied dry as purchased	Chipman Chemicals Ltd. Commereial Chemicals Ltd. Shanahan's Ltd. National Grain Co. Ltd. National Grain. Co. T & T Seeds & Chemicals Ltd. Hastings & Sons Ltd. The Dow Chemical Co.	Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt Sodium Salt	6.5 6.5 6.5 6.5 6.5 5.0 6.5 6.5	lb. oz.	lb. oz.	lb. oz.	lb. oz.	
				2	3	4	15	6
				14	14	13	15	6
				2	3	4	15	6
				2	3	4	15	6
				2	3	4	15	6
				2	3	4	15	6
				3	5	6	20	0
				2	3	4	15	6
				2	3	4	15	6
				2	3	4	15	6
				2	3	4	15	6
				2	3	4	15	6

SODIUM SALTS

Chipman 2,4-D Sodium Salt Dust  
De-Weed Dust  
Killoweed Sodium Salt Dust No. 65  
National Stantox Sodium Salt Dust  
National Sodium Salt Dust  
T & T 2,4-Dust Sodium Salt  
Weedaway S. D 6½  
2,4-Dow, Weed Killer Dust



AMINES

Chipman 2,4-D Amine Dust  
T & T 2,4-Dust (Amine)

Chipman Chemicals Ltd.  
T & T Seeds & Chemicals Ltd.

Triethanolamine  
Triethanolamine

6.0  
6.0

3  
3

2  
2

4  
4

3  
3

5  
5

3  
3

16  
16

10  
10

ESTERS

Chipman 2,4-D Ester Dust  
Esteron Dust No. 5  
Killoweed Ester Dust No. 5  
National Ester Dust  
T & T 2,4-Dust (Ester)  
Weedaway E.D. 5.  
Weed-Cop E. 5.

Chipman Chemicals Ltd.  
The Dow Chemical Co.  
Shanahan's Ltd.  
National Grain Co.  
T & T Seeds and Chem. Ltd.  
Hastings & Sons Ltd.  
Fairview Chemicals Co.

Isopropyl Ester  
Isopropyl Ester  
Ester Concentrate  
Isopropyl Ester  
Isopropyl Ester  
Isopropyl Ester  
Isopropyl Ester

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OTTAWA  
EDMOND CLOUTIER, C.M.G., B.A., L.Ph.,  
KING'S PRINTER AND CONTROLLER OF STATIONERY  
1949